Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Presently amended) A liquid state *in vitro* assay method to detect a physical or chemical change involving a chemical or biological species which comprises the steps of:

a) performing an assay on a biological species using an assay reagent containing at least one NMR active nucleus, said assay reagent being one of i) introduced as an initial reagent, ii) formed in situ during the assay, and iii) formed as a product of the assay, and

b) hyperpolarising at least one NMR active nucleus of the assay reagent; wherein the degree of hyperpolarisation of the NMR active nucleus is in excess of 0.1%, and wherein steps (a) and (b) are performed simultaneously or sequentially in either order, and

c) analysing the assay reagent and/or the assay by NMR for a physical or chemical change in said biological species that is independent of the interaction of the biological species with the NMR active nucleus; and

d) optionally using the NMR data obtained in step c) to generate further assay result(s).

wherein the NMR active nucleus comprises one of ^{15}N, ^{19}F, ^{31}P, ^{1}H, ^{29}Si and ^{13}C.

2. (Cancelled)

3. (Original) The method of claim 2, wherein the NMR active nucleus is ^{15}N or ^{13}C.

4. (Previously presented) The method of claim 1, wherein the assay reagent is a compound which contains an artificially high concentration of an NMR active nucleus.

5. (Previously presented) The method of claim 4, wherein the assay reagent contains an artificially high concentration of the NMR active nucleus in up to 10 defined positions.

6. (Previously presented) The method of claim 1, wherein the assay reagent is an organic compound comprising one or more NMR active nuclei associated with a bond which is broken during the course of the assay.

7. (Cancelled)

8. (Previously presented) The method of claim 1, wherein the assay reagent is analysed repeatedly in step c) at known time intervals so as to generate information about a change with time of the assay reagent.

9. (Previously presented) The method of claim 1, wherein the assay reagent is a Nucleotide, nucleotide analogue, polynucleotide, amino acid analogue, polypeptide or protein.

10. (Previously presented) The method of claim 1, wherein the assay is a nucleic acid hybridisation assay.

11. (Previously presented) The method of claim 1, wherein the assay is a binding assay.

12. (Previously presented) The method of claim 1, wherein the assay reagent is a compound specifically labelled with at least one NMR active nucleus and the assay reagent is administered to a micro-organism, macro-organism or cultured cells, cellular metabolites or an excretion product of the assay reagent are hyperpolarised and analysed by nuclear magnetic resonance spectroscopy, nuclear magnetic resonance imaging or both.

13. (Previously presented) The method of claim 1, wherein the assay is a binding study performed using micro-organisms or cultured cells

14. (Previously presented) The method of claim 1 wherein said step (b) is repeated to enhance the signal-to-noise ratio.

15. (Previously presented) The method of claim 1 wherein the method exhibits a shortening effect as expressed by the improvement of signal-to-noise per unit time by a factor of 10 or more compared to said method being carried out without hyperpolarisation.

16. – 19 (Cancelled)

20. (Previously presented) The method of claim 1 where the hyperpolarisation of the NMR active nucleus of the assay reagent is carried out by polarisation transfer at a temperature of 4.2 K or less in the presence of a magnetic field of at least 1 T.

21. – 23 (Cancelled)

24. (Previously presented) The method of claim 1, wherein more than one assay is multiplexed and monitored by NMR spectroscopy and/or NMR imaging.

25. (Previously presented) The method of claim 1 wherein the assay is performed in a multiwell or multispot assay array.

26. (Previously presented) The method of claim 1 wherein step c) is performed by examining the assay reagent using both NMR spectroscopy to obtain more than one spectrum, and magnetic resonance imaging to obtain one or more discrete spectral location, and repeating the examination at least once so as to obtain quantitative

information about kinetic or time-dependant alteration in chemistry, environment or structure of the assay reagent.

27. (Previously presented) The method of claim 1, wherein step c) is performed in an aerosol or flow-through device applied to aerosol droplets where the well, surface or container is used to contain the assay reagent.

28.- 29. (Cancelled)

30. (Presently amended) The method of claim 5, wherein the assay reagent contains an artificially-enriched abundance ~~high concentration~~ of the NMR active nucleus in one specific position.

31. (Previously presented) The method of claim 1 wherein the assay reagent the assay reagent is an organic compound comprising two or more NMR active nuclei associated with a chemical bond which is broken during the course of the assay such that when the bond is intact, the said NMR active nuclei are spin coupled and when the bond is broken the spin coupling is disrupted.